

Applicant : Daniel J. Vavrick
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REMARKS

I. Status of Claims for Amendment under 37 CFR §1.111

Claims 1, 2, 5-7, 9, 11, 12 and 29-32 are pending in this application for this Amendment filed in response to the October 3, 2007 Non-Final Office Action in which claims 1-7, 9, 11, 12 and 29-32 were pending. No claims are allowed or deemed allowable.

Reconsideration based on the following remarks is respectfully requested.

II. Amendments under 37 CFR §1.121

By this Amendment, claims 3 and 4 are cancelled without prejudice to or disclaimer of the subject matter contained therein, claims 1, 2, 5-7, 9, 11, 29, 31 and 32 are amended in accordance with 37 CFR §1.121(c).

Claims 1 and 6 are amended to recite features supported in the specification at, for example, page 6, lines 11-24 (corresponding to paragraph [0037] in U.S. Patent Application Publication 2005/0067072), claim 2 is amended to narrow its scope and incorporate corrections, and claims 5, 7, 9, 11, 29, 31 and 32 are amended to correct informalities. No new matter is added by any of these amendments.

III. Claim Summary

Applicant's claimed features are directed are generally directed to a composite reactive material with structural reinforcement for military weaponry. As provided in independent claim 1 and schematically illustrated in FIG. 1, the metal foam forms a matrix (10) producing the void volume (12). The polymer that may contain metal particles (14) imbibes the void volume. See page 9 lines 1-3 (or published paragraph [0048]). Specifically, claim 1 recites a composite reactive material for ordnance that includes metal foam having a void volume, and a halogenated polymer imbibed into the void volume, the polymer formed from at least one monomer, wherein the metal foam and the halogenated polymer together are the reactive material. Claim 31 further comprises a particulate material disposed within the polymer, the particulate material selected from the group consisting of finely divided metal particles, finely divided metal oxide particles, and mixtures of finely divided metal particles and finely divided metal oxide particles.

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By contrast, reactive materials described in the background consisted largely of polymers and polymer mixtures. See the specification at page 2 lines 18-32 (paragraphs [0010] – [0012]). However, polymers tend to deform under the influence of accelerative forces such as a propellant charge, rendering them unsuitable for ordnance that frequently depends on shape for damage effectiveness.

Dependent claim 2 further recites that the metal foam comprises a metal selected from the group consisting of molybdenum, osmium, boron, manganese, magnesium, nickel, mixtures of the foregoing, and an alloy comprising at least one of molybdenum, osmium, boron, manganese, magnesium, and nickel. Dependent claim 5 further recites that the metal foam is at least partially fluorinated.

Dependent claim 6 further recites that the monomer for the halogenated polymer is selected from the group consisting of fluoroalkyl esters of acrylic acid, tetrafluoroethylene, chlorotrifluoroethylene, dichlorodifluoroethylene, hexafluoropropylene, vinylidene dichloride, and vinylidene difluoride. Dependent claim 7 further provides that the metal foam comprises polytetrafluoroethylene. Dependent claim 9 further provides that the finely divided metal particles comprise aluminum. Dependent claim 11 further recites that the additive material produces a thermite mixture that includes aluminum particles and iron oxide particles.

Dependent claim 12 further provides ordnance comprising the above recited reactive material. Dependent claim 29 further recites that the material disposed within the polymer is selected to produce a thermite. Dependent claim 30 further provides that the metal foam consists essentially of aluminum, the polymer consists essentially of polytetrafluoroethylene, and the material disposed within the polymer comprises aluminum and iron oxide. Dependent claim 32 further provides that the metal foam constitutes from about 50% to about 35% of the material and the polymer constitutes from about 65% to about 85% of the material.

Applicant has invented a reactive material suitable for various uses that includes a foamed metal and a polymer, with the foamed metal and polymer being chemically reactive at under high stress, such as target impact. Particles of fine metal and/or metal oxide may be embedded in the polymer to moderate or augment the reaction of the reactive materials. Such

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features are described in the specification at, for example, page 5, line 10 – page 11, line 25 (published paragraphs [0031] – [0060]) and exemplified in FIG. 1.

Alternatively, the foamed metal, polymer and added particles may be selected to produce a thermite mixture. Thus, the reactive material, as claimed, includes the metal foam, the polymer imbibed therein, and a particulate material that may be metal and/or metal oxide.

IV. Obviousness Rejection under 35 U.S.C. §103

The Office Action rejects claims 1-7, 9, 11, 12 and 29-32 as being allegedly unpatentable under 35 U.S.C. §103(a) over U.S. Patent 4,764,319 to Hightower Jr. *et al.* (hereinafter “Hightower”) in view of U.S. Patent 4,963,203 to Halcomb *et al.* (hereinafter “Halcomb”). This rejection is rendered moot with respect to claims 3 and 4, and is respectfully traversed for the remaining claims.

Hightower and Halcomb, alone or in combination, do not teach or suggest a composite reactive material for ordnance including a metal foam having a void volume, and a halogenated polymer imbibed into said void volume, wherein the halogenated polymer is formed from at least one monomer, wherein the metal foam and the halogenated polymer together are the reactive material, as recited in claim 1. This extends to claims 2 and 5-7, 9, 11, 12 and 29-32 based on their dependency from claim 1.

Additionally, the applied references fail to teach either the further inclusion of a particulate material disposed within said halogenated polymer, the particulate material selected from the group consisting of finely divided metal particles, finely divided metal oxide particles, and mixtures of finely divided metal particles and finely divided metal oxide particles, as recited in claim 31 or the monomers being selected from the group consisting of fluoroalkyl esters of acrylic acid, tetrafluoroethylene, chlorotrifluoroethylene, dichlorodifluoroethylene, hexafluoropropylene, vinylidene dichloride, and vinylidene difluoride, as recited in claim 6.

Instead, Hightower discloses a rocket propellant for high acceleration. In particular, Hightower teaches a homogeneous mass 12 within a reticulated structure 14 to form a solid propellant grain 10. The reticulated structure 14 is preferably noncombustable. See col. 2, line 51 – col. 3, line 26 of Hightower. However, such propellant 10 does not constitute a reactive material. There is no teaching or suggestion in Hightower that the propellant mass 12 constitutes

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a halogenated polymer. Also, Hightower fails to teach or suggest the reticulated structure as composed of molybdenum, osmium, boron, manganese, magnesium, nickel, as identified in claim 2.

The Office Action acknowledges at page 2 that Hightower fails to disclose the features related to a halogenated polymer and the metal foam being reactive therewith, but asserts that Halcomb teaches Teflon® as a binder with which to modify Hightower. The Office Action further asserts at page 3 that Halcomb teaches particulate material of aluminum particles disposed within the polymer in combination with Hightower to render the claims as obvious. The Office Action at page 4 additionally "considers combustibility and reactivity to be the same" regarding previous arguments for patentability. Applicant respectfully disagrees.

The chemical characteristics of a propellant, such as in Hightower, differ markedly from a reactive material as provided in Applicant's claimed features. The *McGraw-Hill Dictionary of Scientific and Technical Terms* 5/e, S. P. Parker, ed., ©1994 provides the following definitions:

combustion [CHEM] The burning of a gas, liquid or solid, in which the fuel is oxidized evolving heat and often light. (p. 413)

reactivity [CHEM] The relative capacity of an atom, molecule or radical to combine chemically with another atom, molecule or radical. (p. 1658)

Artisans of ordinary skill would understand the relative differences in rate and energy release between rapid oxidation associated with combustion and the less energetic chemical changes associated with reactivity. Consequently, these do not constitute the same phenomena, and one of ordinary skill would neither conflate the two, nor have motivation to consider a propellant to provide a modifiable teaching source for providing a reactive material.

Applicant asserts that the Examiner's treatment of combustibility and reactivity to be the same is merely a conclusory statement, and that no support for such a statement has been provided. When relying on what is asserted to be general knowledge to negate patentability, that knowledge must be articulated and placed on the record. Providing only conclusory statements when dealing with particular combinations of prior art in specific claims cannot support an assertion of obviousness. See *In re Lee*, 61 USPQ 2d 1430, 1434-35 (Fed. Cir. 2002).

Although the Examiner may take official notice of facts outside of the record which are capable of instant and unquestionable demonstration as being "well known" in the art, "if the

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applicant traverses such an assertion, the Examiner should cite a reference in support of his or her position." MPEP §2144.03. Thus, Applicant submits that the reliance on unsupported *per se* knowledge does not negate the patentability of the subject matter of the claims, and further that a *prima facie* case of obviousness has not been properly established.

In addition, Halcomb does not compensate for the deficiencies of Hightower. Instead, Halcomb discloses a thermite composition to produce gasses. In particular, Halcomb teaches the composition as including an oxidizable metal, an oxidizing reagent and a gas-producing additive, such as metal carbides and metal nitrides for high-temperature stability. See col. 2, lines 20-29 of Halcomb. In the background, Halcomb describes Teflon[®] as a prospective decomposable gas-producing additive. See col. 1, lines 14-41 of Halcomb. Applicant comments that Teflon[®] represents a tradename for polytetrafluoroethylene (PTFE). However, Halcomb presents no teaching or suggestion for either halogenated polymers for imbibing into a void volume to react with metal foam (as opposed to decompose), as provided in claim 1. Nor does Halcomb indicate any of the list of fluoroalkyl esters of acrylic acid, tetrafluoroethylene, chlorotrifluoroethylene, dichlorodifluoroethylene, hexafluoropropylene, vinylidene dichloride, and vinylidene difluoride, as recited in claim 6.

Further, there is insufficient motivation to combine features related to the propellant of Halcomb with the thermite of Hightower. Moreover, the Office Action has not established proper motivation for a *prima facie* case of obviousness. Because the purpose of Teflon[®] as a thermite gas-producing decomposing additive in Halcomb differs fundamentally in operation and in purpose from Applicant's features for a halogenated polymer to react with metal foam, expectation of success to combine these teachings with the dense propellant of Hightower cannot be reasonable. Even assuming that motivation to combine the applied references is established, the combination fails to teach or suggest Applicant's claimed features taken together.

A *prima facie* case of obviousness for a §103 rejection requires satisfaction of three basic criteria: there must be some suggestion or motivation either in the references or knowledge generally available to modify the references or combine reference teachings, a reasonable expectation of success, and the references must teach or suggest all the claim limitations. See

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MPEP §706.02(j). Applicant asserts that the Office Action fails to satisfy any of these requirements with Hightower and Halcomb.

Consequently, all the claims are in condition for allowance. Thus, Applicant respectfully requests that the rejection under 35 U.S.C. §103 be withdrawn.

V. Conclusion

In view of the foregoing amendments and remarks, Applicant respectfully submits that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicant's undersigned representative at the telephone number listed below.

Respectfully submitted,


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